

# INTERNATIONAL COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|  |   |  |
|--|---|--|
| Applicant's or agent's file reference<br><b>20000 PC 1</b> | <b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |  |
| International application No.<br><b>PCT/DK 99/ 00515</b>   | International filing date (day/month/year)<br><b>30/09/1999</b>   | (Earliest) Priority Date (day/month/year)<br><b>01/10/1998</b> |
| Applicant<br><b>2C A/S et al.</b>                          |   |  |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

### 4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

### 5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1  
☐ None of the figures.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 99/ 00515

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 2: add "(14)" after "specimens"

Line 9: add "(13)" after "disc" and add "(17)" after "axis"

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/DK 99/00515

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N15/14 G01N35/00 G01N21/64

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                   | Relevant to claim No.                                   |
|------------|--|---|
| X          | EP 0 392 475 A (IDEMITSU PETROCHEMICAL CO)<br>17 October 1990 (1990-10-17)                           | 1-4, 10,<br>11, 14,<br>15, 27, 28                       |
| Y          | column 5, line 1 - line 38<br>column 6, line 20 - line 28<br>column 7, line 37 - line 53<br>—<br>-/- | 5-8, 12,<br>13, 16,<br>18, 21,<br>22, 24,<br>26, 29, 30 |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

10 December 1999

Date of mailing of the international search report

17/12/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3018

Authorized officer

Navas Montero, E

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/DK 99/00515

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.         |
|------------|--|-------------------------------|
| Y          | US 4 758 727 A (TOMEI L DAVID ET AL)<br>19 July 1988 (1988-07-19)<br><br>column 1, line 38 - line 48<br>column 2, line 34 - line 38<br>column 5, line 25 - line 31<br>column 6, line 19 - line 39<br>column 7, line 33 - line 35 | 5-8, 18,<br>24, 26,<br>29, 30 |
| Y          | US 5 656 429 A (ADELMAN LONNIE W)<br>12 August 1997 (1997-08-12)<br>column 2, line 27 - line 48  | 12, 13                        |
| Y          | GB 2 243 681 A (GALAI LAB LTD)<br>6 November 1991 (1991-11-06)<br>page 1, line 1 - line 7<br>page 1, line 25 - page 2, line 4<br>page 2, line 24 - line 27<br>page 4, line 10 - line 21<br>page 5, line 12 - line 18             | 16                            |
| Y          | GB 1 388 107 A (SKINNER G K)<br>19 March 1975 (1975-03-19)<br>page 4, line 86 - line 113<br>page 7, line 105 - line 117<br>figure 2  | 21, 22                        |
| X          | WO 96 09548 A (GORDON JOHN FRANCIS ; UNIV<br>DUNDEE (GB)) 28 March 1996 (1996-03-28)<br><br>page 6, line 24 - page 7, line 13<br>page 20, line 23 - page 21, line 10   | 1-8, 10,<br>11, 14,<br>27-30  |
| X, P       | WO 99 07897 A (ERICOMP)<br>18 February 1999 (1999-02-18)<br>the whole document   | 1, 12, 13                     |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/DK 99/00515

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) |   | Publication<br>date |
|---|---|---------------------|----------------------------|---|---------------------|
| EP 0392475                                | A | 17-10-1990          | JP 2269938                 | A | 05-11-1990          |
|   |   |                     | CA 2014294                 | A | 11-10-1990          |
| US 4758727                                | A | 19-07-1988          | US 4877966                 | A | 31-10-1989          |
| US 5656429                                | A | 12-08-1997          | AU 689964                  | B | 09-04-1998          |
|   |   |                     | AU 3733995                 | A | 26-04-1996          |
|   |   |                     | CA 2201594                 | A | 11-04-1996          |
|   |   |                     | EP 0781346                 | A | 02-07-1997          |
|   |   |                     | JP 10506786                | T | 07-07-1998          |
|   |   |                     | WO 9610644                 | A | 11-04-1996          |
| GB 2243681                                | A | 06-11-1991          | NONE                       |   |                     |
| GB 1388107                                | A | 19-03-1975          | NONE                       |   |                     |
| WO 9609548                                | A | 28-03-1996          | AU 3481595                 | A | 09-04-1996          |
|   |   |                     | BR 9509021                 | A | 30-12-1997          |
|   |   |                     | CA 2200562                 | A | 28-03-1996          |
|   |   |                     | CN 1158659                 | A | 03-09-1997          |
|   |   |                     | EP 0782705                 | A | 09-07-1997          |
|   |   |                     | JP 10504397                | T | 28-04-1998          |
|   |   |                     | US 5892577                 | A | 06-04-1999          |
| WO 9907897                                | A | 18-02-1999          | AU 8778898                 | A | 01-03-1999          |

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For Receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) 20000 PC 1

### Box No. I TITLE OF INVENTION

AN APPARATUS FOR DETERMINING THE POSITION OF AN OBJECT

### Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

2C A/S  
Rørmosen 306  
DK-2990 Nivå  
Denmark

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

DK

State (that is, country) of residence:

DK

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

### Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CASPERSEN, Christian  
Rørmosen 306  
DK-2990 Nivå  
Denmark

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

DK

State (that is, country) of residence:

DK

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

### Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Plougmann, Vingtoft & Partners  
Sankt Annæ Plads 11  
P.O.Box 3007  
DK-1021 Copenhagen K  
Denmark

Telephone No.

+45 33 63 93 00

Facsimile No.

+45 33 63 96 00

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates                  | <input checked="" type="checkbox"/> LR Liberia   |
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LS Lesotho   |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> LT Lithuania   |
| <input checked="" type="checkbox"/> AT Austria and utility model             | <input checked="" type="checkbox"/> LU Luxembourg  |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> LV Latvia  |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            | <input checked="" type="checkbox"/> MD Republic of Moldova   |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina                | <input checked="" type="checkbox"/> MG Madagascar  |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia                             |
| <input checked="" type="checkbox"/> BG Bulgaria                              |  |
| <input checked="" type="checkbox"/> BR Brazil                                | <input checked="" type="checkbox"/> MN Mongolia  |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> MW Malawi  |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> MX Mexico  |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> NO Norway  |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> NZ New Zealand   |
| <input checked="" type="checkbox"/> CU Cuba                                  | <input checked="" type="checkbox"/> PL Poland  |
| <input checked="" type="checkbox"/> CZ Czech Republic and utility model      | <input checked="" type="checkbox"/> PT Portugal  |
| <input checked="" type="checkbox"/> DE Germany and utility model             | <input checked="" type="checkbox"/> RO Romania   |
| <input checked="" type="checkbox"/> DK Denmark and utility model             | <input checked="" type="checkbox"/> RU Russian Federation  |
| <input checked="" type="checkbox"/> EE Estonia and utility model             | <input checked="" type="checkbox"/> SD Sudan   |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SE Sweden  |
| <input checked="" type="checkbox"/> FI Finland and utility model             | <input checked="" type="checkbox"/> SG Singapore   |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SI Slovenia  |
| <input checked="" type="checkbox"/> GD Grenada                               | <input checked="" type="checkbox"/> SK Slovakia and utility model  |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> SL Sierra Leone  |
| <input checked="" type="checkbox"/> GH Ghana                                 | <input checked="" type="checkbox"/> TJ Tajikistan  |
| <input checked="" type="checkbox"/> GM Gambia                                | <input checked="" type="checkbox"/> TM Turkmenistan  |
| <input checked="" type="checkbox"/> HR Croatia                               | <input checked="" type="checkbox"/> TR Turkey  |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago   |
| <input checked="" type="checkbox"/> ID Indonesia                             | <input checked="" type="checkbox"/> UA Ukraine   |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> UG Uganda  |
| <input checked="" type="checkbox"/> IN India                                 | <input checked="" type="checkbox"/> US United States of America  |
| <input checked="" type="checkbox"/> IS Iceland                               |  |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> UZ Uzbekistan  |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> VN Viet Nam  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> YU Yugoslavia  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa  |
|  | <input checked="" type="checkbox"/> ZW Zimbabwe  |
| <input checked="" type="checkbox"/> KR Republic of Korea                     | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> KZ Kazakhstan                            | <input checked="" type="checkbox"/> DM Dominica  |
| <input checked="" type="checkbox"/> LC Saint Lucia                           | <input checked="" type="checkbox"/> CR Costa Rica  |
| <input checked="" type="checkbox"/> LK Sri Lanka                             | <input checked="" type="checkbox"/> TZ Tanzania  |

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

| Box No. VI PRIORITY CLAIM                           |                               | <input type="checkbox"/> Further priority claims are indicated in the Supplemental Box. |                                       |   |
|---|-------------------------------|---|---------------------------------------|---|
| Filing date of earlier application (day/month/year) | Number of earlier application | Where earlier application is:   |                                       |   |
|   |                               | national application: country   | regional application: regional Office | international application: receiving Office |
| item (1)<br>01.10.1998                              | PA 1998 01243                 | Denmark   |                                       |   |
| item (2)  |                               |   |                                       |   |
| item (3)  |                               |   |                                       |   |

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1)

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

## Box No. VII INTERNATIONAL SEARCHING AUTHORITY

|   |  |           |                              |
|---|--|-----------|------------------------------|
| Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): | Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): |           |                              |
| ISA / EP  | Date (day/month/year)  | Number    | Country (or regional Office) |
|   | 30 June 1999   | RS 103151 | EP                           |

## Box No. VIII CHECK LIST; LANGUAGE OF FILING

|   |  |
|---|--|
| This international application contains the following number of sheets: | This international application is accompanied by the item(s) marked below:                                       |
| request : 3   | 1. <input checked="" type="checkbox"/> fee calculation sheet   |
| description (excluding sequence listing part) : 17                      | 2. <input checked="" type="checkbox"/> separate signed power of attorney   |
| claims : 4  | 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any:                         |
| abstract : 1  | 4. <input type="checkbox"/> statement explaining lack of signature   |
| drawings : 1  | 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s):                            |
| sequence listing part of description :                                  | 6. <input type="checkbox"/> translation of international application into (language):                            |
| Total number of sheets : 26   | 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material |
|   | 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form              |
|   | 9. <input type="checkbox"/> other (specify):   |

|  |  |
|--|--|
| Figure of the drawings which should accompany the abstract: Fig. 1 | Language of filing of the international application: English |
|--|--|

## Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Copenhagen, 30 September 1999

Plougmann, Vingtoft & Partners A/S

  
Henrik Bagger Olsen

| For receiving Office use only  |   | 2. Drawings:<br><br><input type="checkbox"/> received:<br><br><input type="checkbox"/> not received: |
|--|---|--|
| 1. Date of actual receipt of the purported international application:                    | 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: |  |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2):           | 5. International Searching Authority (if two or more are competent): ISA /  |  |
| 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid. |   |  |

| For International Bureau use only                               |
|---|
| Date of receipt of the record copy by the International Bureau: |



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



|   |   |  |
|---|---|--|
| Applicant's or agent's file reference<br>20000 PC 1                                       | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/DK99/00515   | International filing date (day/month/year)<br>30/09/1999  | Priority date (day/month/year)<br>01/10/1998 |
| International Patent Classification (IPC) or national classification and IPC<br>G01N15/14 |   |  |
| Applicant<br>2C A/S et al.  |   |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

|   |  |
|---|--|
| Date of submission of the demand<br><br>27/04/2000  | Date of completion of this report<br><br>04. 01. 01  |
| Name and mailing address of the international preliminary examining authority:<br><br> European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized officer<br><br>Hoogen, R<br><br>Telephone No. +49 89 2399 2192<br><br> |

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/DK99/00515

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

**Description, pages:**

1-17 as originally filed

**Claims, No.:**

1-37 with telefax of 14/12/2000

**Drawings, sheets:**

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/DK99/00515

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

|                               |      |        |                   |
|-------------------------------|------|--------|-------------------|
| Novelty (N)                   | Yes: | Claims | 3-6, 18-26, 28-37 |
|                               | No:  | Claims | 1, 2, 7-17, 27    |
| Inventive step (IS)           | Yes: | Claims |                   |
|                               | No:  | Claims | 3-6, 18-26, 28-37 |
| Industrial applicability (IA) | Yes: | Claims | 1-37              |
|                               | No:  | Claims |                   |

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Re Item VIII**

**Certain observations on the international application**

1. The amendments filed with the fax dated 14 December 2000 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT.

**Claims 1, 4, 5, 6, 29, and 32-34** contain expressions like "at least a first light source", "at least a first light beam", "two or more light sources", etc. which imply that there is more than one light source present. No basis for these amendments can be found in the application as originally filed.

The description only supports configurations with a single light source emitting a single first beam towards the specimen, said light beam being either monochromatic or comprising several different wavelengths. The light source may be a monochromatic source (e.g. a single-wavelength laser), a broad-banded source, or multi-wavelength laser (cf. page 7, lines 1-14; page 12, lines 1-17).

The assessment of novelty and inventive step is based on the assumption that the above-mentioned claims were modified such that only a single light source is present.

2. **Claim 19:**

This claim incorrectly refers back to claims 1-17 where, however, the rotating light source is not yet introduced.

3. **Claims 21 and 22:**

The term "first mirror" is unclear since it implies that the deflecting means comprise at least two mirrors. However, no further mirrors are mentioned in the description or in the claims.

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: WO 96 09548 A (GORDON JOHN FRANCIS ;UNIV DUNDEE (GB)) 28 March 1996 (1996-03-28)  
D2: US-A-4 758 727 (TOMEI L DAVID ET AL) 19 July 1988 (1988-07-19)  
D3: GB-A-1 388 107 (SKINNER G K) 19 March 1975 (1975-03-19)

**2. Apparatus claims 1-28**

**2a. Claim 1**

Document D1 discloses an apparatus for detecting a property of an object in a specimen, the apparatus comprising a frame, a member positioned on the frame and having a surface that is adapted to receive and hold the specimen, a light source for emission of a first light beam towards the specimen held by the member, at least one detector for detection of light emitted from the object upon interaction with said first light beam, and scanning means for scanning said first light beam in relation to the at least one detector across the specimen along a non-linear curve (cf. page 9, lines 4-22).

The statement in claim 1 that the objects of the specimen are stained with two or more fluorescent markers specifies the apparatus only in so far as the light emitted by the light source has to be adapted to excite fluorescence in the specimen and that the detector has to be adapted to detect light at the corresponding emission wavelengths. These apparatus features are also known from D1 (cf. page 23, lines 5-9).

Thus, the subject-matter of claim 1 is anticipated by D1.

**2b. Claims 2-28**

Dependent claims 2-28 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Articles 33(2) and 33(3) PCT), the reasons being as follows:

**Claims 2, 7-12, 15-17, and 27:**

The additional features of these claims are known from D1 (cf. page 12, lines 7-10; page 20, line 15 - page 21, line 10; page 4, lines 19-26; page 2, lines 22-26;

figure 6)

**Claims 3-6:**

The use of two or more detectors adapted to detect light of two or more different wavelengths and the use of scanning means adapted to perform successive scans are an obvious design possibility.

**Claims 13 and 14:**

These claims are formulated in terms of steps of a method and it is not clear which technical features of an apparatus they imply. The idea of storing position information together with the detector signal and to retrieve this information in order to reposition the optical head above a detected object of interest is clearly present in D1 (cf. page 4, lines 19-26).

**Claims 18-22:**

These claims are directed to obvious alternatives of providing a circular scan curve. In particular the approach of scanning a stationary specimen by means of movable mirrors, the light source being stationary, is known from D2, which describes a device for rapid wide-field scanning of laser-induced fluorescence in a biological specimen (cf. abstract; column 4, lines 58-62).

**Claims 23-25:**

The use of rectangular apertures in the optical path between the specimen and the detector is known from D3 (cf. page 4, lines 98-102). The dimension of the aperture as proposed in claim 25 is within the range envisaged by the skilled person.

**Claim 26:**

Fluorescein is a fluorescent marker commonly used in biochemical tests.

**Claim 28:**

D1 does not disclose the exact diameter of the light spot scanning the specimen. This leaves the skilled person with the problem of filling this gap in the disclosure of D1. D2 discloses an apparatus similar to the one described in D1, said apparatus providing a resolution of 5-10  $\mu\text{m}$  (cf. column 2, lines 41-43). Since the resolution is essentially determined by the spot diameter, this means that D2 discloses a spot diameter of approximately 10  $\mu\text{m}$ , which is the same order of

magnitude than the 20  $\mu\text{m}$  claimed in present claim 28. No unexpected technical effect can be seen in using a spot size in the range of 20-140  $\mu\text{m}$  which is within the range of values contemplated by the skilled person when confronted with the problem of selecting a spot size. Furthermore, D2 explains how to vary the spot diameter as desired (cf. column 4, lines 19-26 and 39-44). The only limitation is on the small side where the spot size is diffraction limited, in the case of the wavelengths used in D2 to approximately 1  $\mu\text{m}$ . In view of D1 and D2 the subject-matter of claim 28 is therefore not considered to involve an inventive step in the sense of Article 33(3) PCT.

**3. Method claims 29-37**

**3a. Claim 29**

D1 discloses a method of detecting a property of an object contained in a specimen comprising all steps of claim 29 except that it is merely stated that the objects are stained with a fluorescent marker (cf. page 9, lines 4-22; page 23, lines 5-9), whereas according to the method of claim 29 the objects are stained with two or more fluorescent markers.

However, this feature is within the normal range of possibilities envisaged by the skilled person when confronted with the problem of detecting more than one property of an object. Thus, the method according to claim 29 is not considered to involve an inventive step.

**3b. Claims 30-37**

Dependent claims 30-37 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), the reasons being as follows:

**Claims 30-34:**

The use of a single light source for generating the exciting radiation and the use of a plurality of detectors, each sensitive to a particular emission wavelength, is an obvious design possibility.

**Claims 35-37:**

The additional features of these claims are known from D1 (cf. page 3, lines 10-12; page 4, lines 19-26; page 20, lines 17-22; figure 6).

**Re Item VII**

**Certain defects in the international application**

**1. Description**

- 1a. The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.
- 1b. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

**2. Claims**

- 2b. Independent claims 1 and 29 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 2b. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).



**CLAIMS**

1. An apparatus for detecting a property of an object contained in a specimen, the apparatus comprising
- 5 a frame,
- a member positioned on the frame and having a surface that is adapted to receive and hold the specimen,
- 10 at least a first light source for emission of at least a first light beam towards the specimen held by the member,
- at least one detector for detection of light emitted from the object upon interaction with the
- 15 at least first light beam, and
- scanning means for scanning the at least first light beam in relation to the at least one detector across the specimen along a non-linear curve,
- 20 wherein the objects of the specimen are stained with two or more fluorescent markers.
2. An apparatus according to claim 1, wherein the two or more fluorescent markers are excited by a single light source.
- 25 3. An apparatus according to claim 2, wherein two or more detectors are adapted to detect light emitted from each of the two or more fluorescent markers.
4. An apparatus according to claim 1, wherein the two or more fluorescent markers are excited by two or more light sources.
- 30 5. An apparatus according to claim 4, wherein the scanning means are adapted to perform successive scans of the specimen, the one or more light beams in each scan and in each successive scan being adapted to excite specific markers on the objects.

6. An apparatus according to claim 5, wherein one detector is adapted to detect light emitted from each marker excited by the one or more light sources in a single scan.
7. An apparatus according to any of the preceding claims, wherein the member is positioned for rotation about an axis on the frame and the scanning means comprise means for rotating the member about the axis.
8. An apparatus according to any of the preceding claims, further comprising scanning control means for controlling the scanning means for scanning the specimen along a predetermined curve.
9. An apparatus according to claim 8, wherein the scanning control means are adapted to control the scanning means in such a way that the predetermined curve is a substantially circular curve.
10. An apparatus according to claim 8 or 9, further comprising storage means for storage of signals provided by the detector and corresponding position signals provided by the scanning control means.
11. An apparatus according to claim 10, further comprising means for sampling and digitising the detector signals and the position signals.
12. An apparatus according to any of the preceding claims, further comprising signal processing means operatively connected to the detector to detect a presence of an object based on the detector signals.
13. An apparatus according to claim 12, wherein position signals relating to detected objects are stored in the storage means.
14. An apparatus according to claim 13, wherein the stored positions of the detected objects are retrieved, and used by said scanning means to position a means for optical inspection of detected objects.
15. An apparatus according to any of the preceding claims, wherein the specimen has an area larger than 500 mm<sup>2</sup>.

16. An apparatus according to any of the preceding claims, wherein the specimen has an area larger than 8000 mm<sup>2</sup>.
- 5 17. An apparatus according to any of the preceding claims, wherein the scanning means further comprise deflecting means for scanning the first light beam across the specimen along a radius of the circular movement of the member.
18. An apparatus according to any of the preceding claims, wherein the light source is  
10 positioned for rotation about an axis on the frame and the scanning means comprise means for rotating the light source about the axis.
19. An apparatus according to any of the preceding claims, wherein the scanning means further comprise deflecting means for scanning the first light beam across the specimen  
15 along a radius of the circular movement of the light source.
20. An apparatus according to any of the preceding claims, wherein the scanning means further comprise movable deflecting means for variable deflection of the first light beam.
- 20 21. An apparatus according to claim 20, wherein the movable deflecting means comprise a first mirror that is rotatable around a first axis so that the first light beam can be scanned across the specimen along a substantially circular curve.
22. An apparatus according to claim 21, wherein the first mirror is further rotatable around  
25 a second axis for variation of the radius of the circular curve.
23. An apparatus according to any of the preceding claims, wherein a mask is inserted in the optical path between the specimen and the detector, and  
30 the mask comprises at least one transparent aperture.
24. An apparatus according to claim 23, wherein the aperture shape is a substantially rectangular shape.

25. An apparatus according to claim 23 or 24, wherein at least one dimension of the aperture, as projected on the specimen, is between 0.75 and 2 times the dimensions of objects to be detected.

5 26. An apparatus according to any of the preceding claims, wherein one of the two or more fluorescent markers is Fluorescein.

27. An apparatus according to any of the preceding claims, wherein the light source is a coherent light source.

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28. An apparatus according to any of the preceding claims, wherein the first light beam is adapted to provide a light spot having a diameter between 20-150µm on the specimen,

29. A method of detecting a property of an object contained in a specimen and comprising  
15 the steps of:

positioning the specimen on a member having a surface that is adapted to receive and hold the specimen,

20 staining the objects with two or more fluorescent markers,

emitting at least a first light beam towards the specimen held by the member  
scanning the at least first light beam in relation to a detector across the specimen along a non-linear curve, and

25

detecting light emitted from the object stained with two or more markers upon interaction with the at least first light beam during scanning of the specimen.

30. A method according to claim 29, comprising the step of exciting the two or more  
30 fluorescent markers by a single light source.

31. A method according to claim 30, further comprising the step of detecting light emitted from each of the two or more fluorescent markers by two or more detectors.

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32. A method according to claim 29, comprising the step of exciting the two or more fluorescent markers by two or more light sources.

33. A method according to claim 32, further comprising the step of scanning the scanning  
5 means successively over the specimen, the one or more light beams in each scan and in each successive scan being adapted to excite specific markers on the objects.

34. A method according to claim 33, comprising the step of detecting light emitted from each marker excited by the one or more light sources in a single scan by one detector.

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35. A method according to any of claims 29-34, further comprising the step of rotating the member holding the specimen about an axis.

36. A method according to any of claims 29-35, further comprising the step of storing  
15 signals relating to the detected property and corresponding data relating to the current position of the member.

37. A method according to claim 36, further comprising the step of sampling and digitising the signals and the data.

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